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INTRODUCTION

The safety and efficiency of operation on a highway depends a great deal upon the placement of highway signing as a means of informing, warning and controlling drivers. The signing of highways requires both roadside ground mounted and overhead signs.

Normally the Geometric Design Section coordinates the design and details of permanent signing plans into the construction plans. This includes the signing quantity sheets and sign layout sheets. Permanent Signing Construction Plans can be let as a project by itself or can be placed in projects also containing roadway and bridge construction.

The Bridge Design Section's primary function is to maintain the standard structural sign details for roadside ground mounted and overhead signs to be placed in the construction plans. A written request must be made to the Bridge Design Engineer to obtain the standard structural signing details to be used in DOTD projects. This request should be coordinated with the Geometric Design Engineer. The standard sign details include the roadside ground mounted breakaway signs (sign panel and sign post details) and overhead signs (type II truss, cantilever truss and fascia details).

Location, reflectorization, and lighting of signs are important considerations in signing. For information regarding the design, location and application of sign reference should be made to the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD).

Highway signs with the potential of being a hazard to motorists should be placed outside of clear zones, behind guardrail or barriers, or on structures. If these measures are not feasible, the roadside sign supports must be breakaway or for overhead sign supports, shielded by appropriate guardrail or barriers. The breakaway and structural design of roadside and overhead signs must comply with the latest edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

For additional general guidelines for breakaway supports and clear zone requirements, refer to the latest edition of the AASHTO Roadside Design Guide.

ROADSIDE GROUND MOUNTED SIGNS

Roadside ground mounted signs generally consist of single post and multiple post-breakaway systems. The details for the breakaway systems generally follow research results developed by different national pooled fund studies. These signs must be designed for vehicle impact and wind loading.

Over the past decades, the vehicle fleet has changed size, configuration and construction. The standard vehicle of 25 years ago weighed 4500 lbs. or greater. There were very few lighter-weight vehicles. As time progressed smaller sedans entered the fleet. Presently 1800 lbs. sedans or mini cars are common place. Thus breakaway signs that were once acceptable for the larger, heavier cars must be adjusted for the smaller cars. The details of our current breakaway installations follow the crash test results performed by a national pool fund study in 1991 coordinated by FHWA to meet current vehicle weights and vehicle impact specifications.

The appropriate procedures for acceptance testing of breakaway supports are based on NCHRP report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Most breakaway posts consist of rolled steel shapes, extruded aluminum shapes or timber. The Departments single and multiple post breakaway signs use a unidirectional or multidirectional slip base design. Multidirectional single breakaway posts are used when a vehicle can impact the sign from any direction. A unidirectional single or multiple post breakaway post is generally used when a vehicle can impact the sign in one direction.

Slip base mechanisms activate when two parallel plates slide apart when bolts are pushed out under impact. The upper hinge on unidirectional multi-post signs consists of a slotted fuse plate on the expected impact side and a saw cut through the web of the post to the near flange. The near flange then acts as a hinge when the post rotates up. Proper function of the slip and fuse plate design requires the proper torque of the bolts.

Attached on page 10 (6) is an example detail of a single post and multiple post breakaway slip base roadside ground mounted sign. Further information on ground mounted signs can be obtained from the standard sign details.

OVERHEAD SIGNS

Overhead signs consist of ground or structure mounted type II trusses, cantilever trusses or fascia signs. The span ranges for the type II trusses can extend up to 36.5 meters. The span ranges for the cantilever trusses can extend up to 10 meters. The type II and cantilever trusses are space frames that consist of steel, aluminum tube, or pipe section. The type II trusses may come in incremental sections, which can be joined by means of a bolted splice. This process helps simplify the erection of the type II truss in the field.

The type II and cantilever trusses are supported by pile footings, drilled shaft footings or attached directly to a bridge or a retaining wall support. The structural supports on a bridge or retaining wall must be designed and detailed on an individual basis. The fascia signs are attached directly to the side of bridge, at the bridge barriers, or at the bottom flanges of the bridge girders. The designer is cautioned to check the design criteria for the overhead sign. The height and wind pressure of each overhead sign must be checked against the design criteria in the standard details. Any difference in criteria must be accounted for by an adjustment of the standard details.

A type II truss summary sheet is included with the standard details. The table on this summary sheet is to be filled out by the designer. The table includes information for the sign number; sign station, sign areas, trusses member sizes, truss camber and anchor bolt sizes. The structure design of the type II trusses is based on an in-house computer program. The computer output will give the most economical truss member sizes, the truss camber and the required anchor bolt diameters for spans ranging from 9 meters to 36.5 meters at increments of 1.8 meters. Member sizes given by the computer output must be checked for availability. The engineer should include a minimum additional 30% to the planned design sign area to account for any future signs placed on the truss. The program assumes the sign panel to be three (3) meters in height and the sign area will vary in increments of 9.3 m². Normally the truss designs are provided upon written request to the Bridge Design Section.

For overhead cantilever signs, the Department maintains a ground mounted and structural mounted standard details. The engineer is required to check the site criteria to each cantilever to see if it matches our standard detail design criteria. This is especially true for cantilevers mounted on bridges at heights above our normal criteria. In cases not covered by our standard detail, individual design and details must be done.

Shop drawings for overhead signs are normally submitted to the design section by the fabricator for review and approval. The fabricator will sometimes request the use of a different diameter pipe or tube than what is called for in the plans, since certain sizes of tube or pipe may not be readily available.

Attached on page 10 (7) through page 10 (12) are examples of details of the type II cantilever trusses showing both structural and ground mounted details. Also attached on page 10 (13) is a sign truss design form to be used by the designer in identifying and designing overhead sign structures. The designer should fill out the top truss design data

table for each overhead sign. The Bridge Design Section will complete the type II truss member size table upon written request.

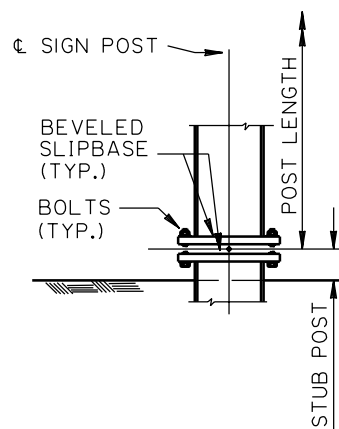
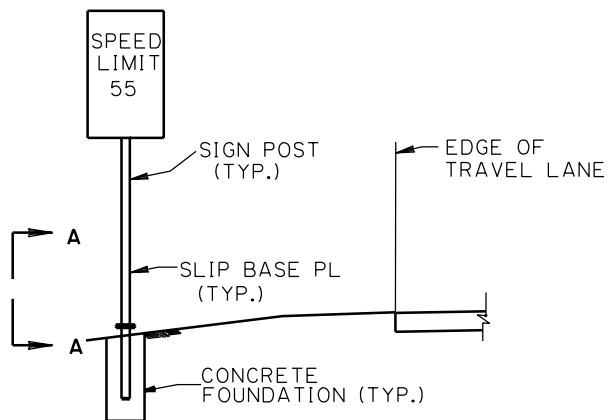
ANALYSIS AND DETAIL INFORMATION

Analysis

1. Ground mounted Multiple post sign supports are considered as cantilever beam-columns that are fully supported against lateral and torsional buckling at sill connections.
2. Ground mounted single post signs are designed as cantilever beam-columns that have unsupported length from the base to the center of pressure of the sign mounted on them.
3. A uniform soil bearing capacity of 143 Pa was used for ground mounted roadside signs.
4. Overhead type II sign trusses are designed as pin connected and simple supported for wind and dead load trusses. The columns for the overhead type II trusses are designed fixed at the base.
5. Structure mounted supports for type II or cantilever overhead sign trusses must be designed and detailed on an individual basis.

Details

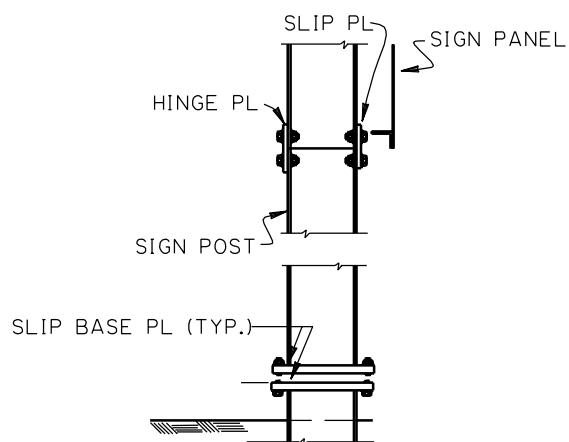
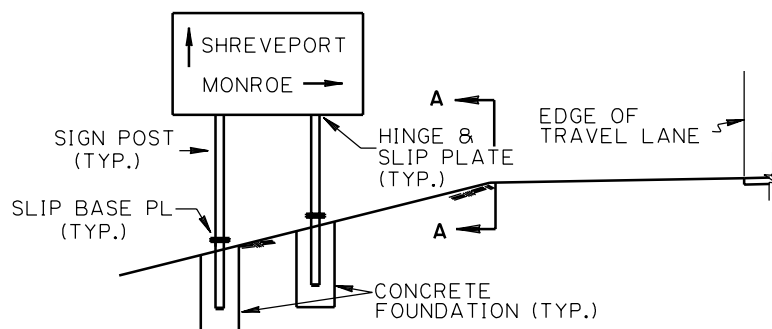
1. Ground mounted single-post signs have a breakaway slip base which is beveled such that the sign is given an upward component of acceleration when hit such that the sign will pass over the top of the colliding vehicle without further contact.
2. Ground mounted multiple-post signs have a breakaway slip base which are beveled such that the sign is given an upward component of acceleration when both posts are hit simultaneously. This probability is deemed to exist when the post spacing is 2.1 meters or less.
3. The directional slip bases should be placed such that their operational characteristics will be the most probable direction of high-speed collision where practical.



VIEW A-A

SINGLE-POST UNIDIRECTIONAL

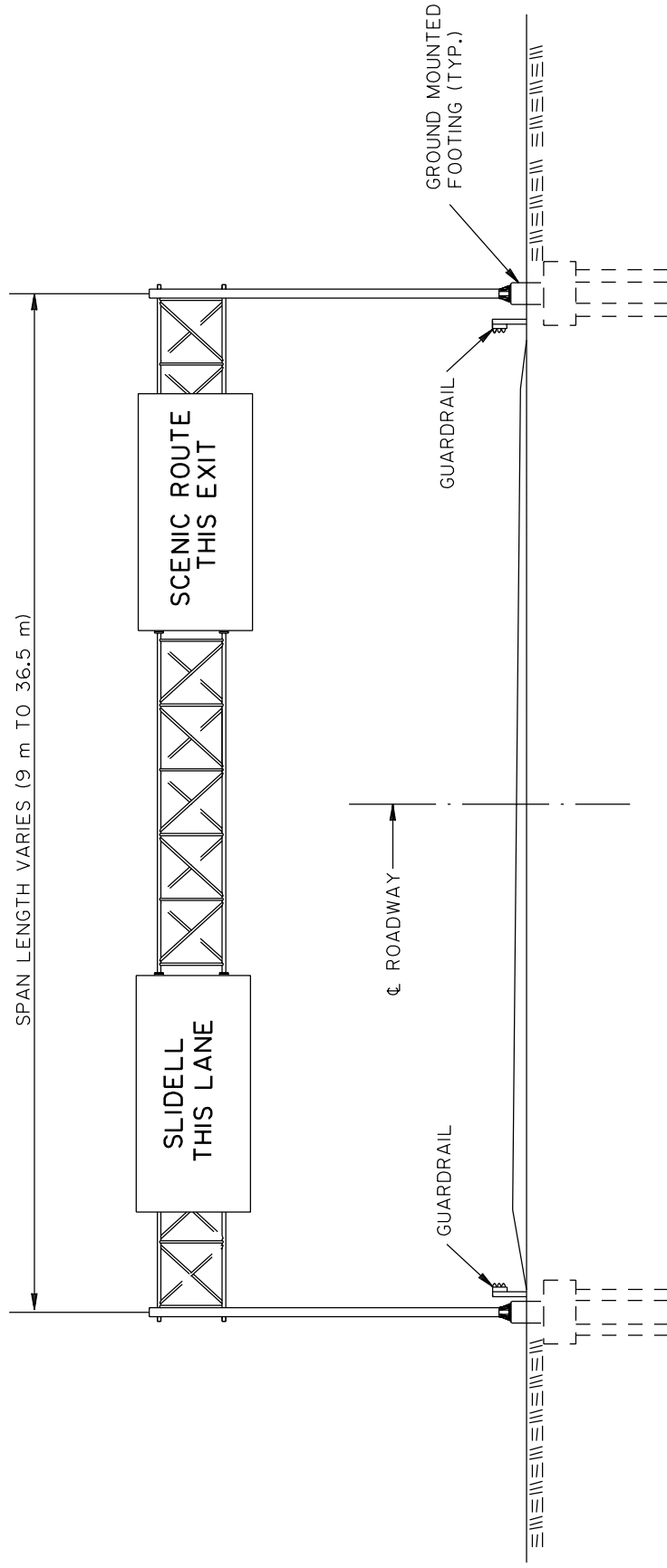
NOTE: FOR FURTHER INFORMATION,
SEE STANDARD SIGNING DETAILS.



VIEW A-A

MULTIPLE-POST UNIDIRECTIONAL

**ROADSIDE GROUND MOUNTED SIGN
TYPICAL DETAILS**



NOTE: FOR FURTHER INFORMATION,
SEE STANDARD SIGNING DETAILS.

TYPE II OVERHEAD SIGN TRUSS GROUND MOUNTED FOOTINGS

SPAN LENGTH VARIES (9 m TO 36.5 m)

MORGAN CITY
THIS LANE

GUIDRY DRIVE
THIS EXIT

CL ROADWAY

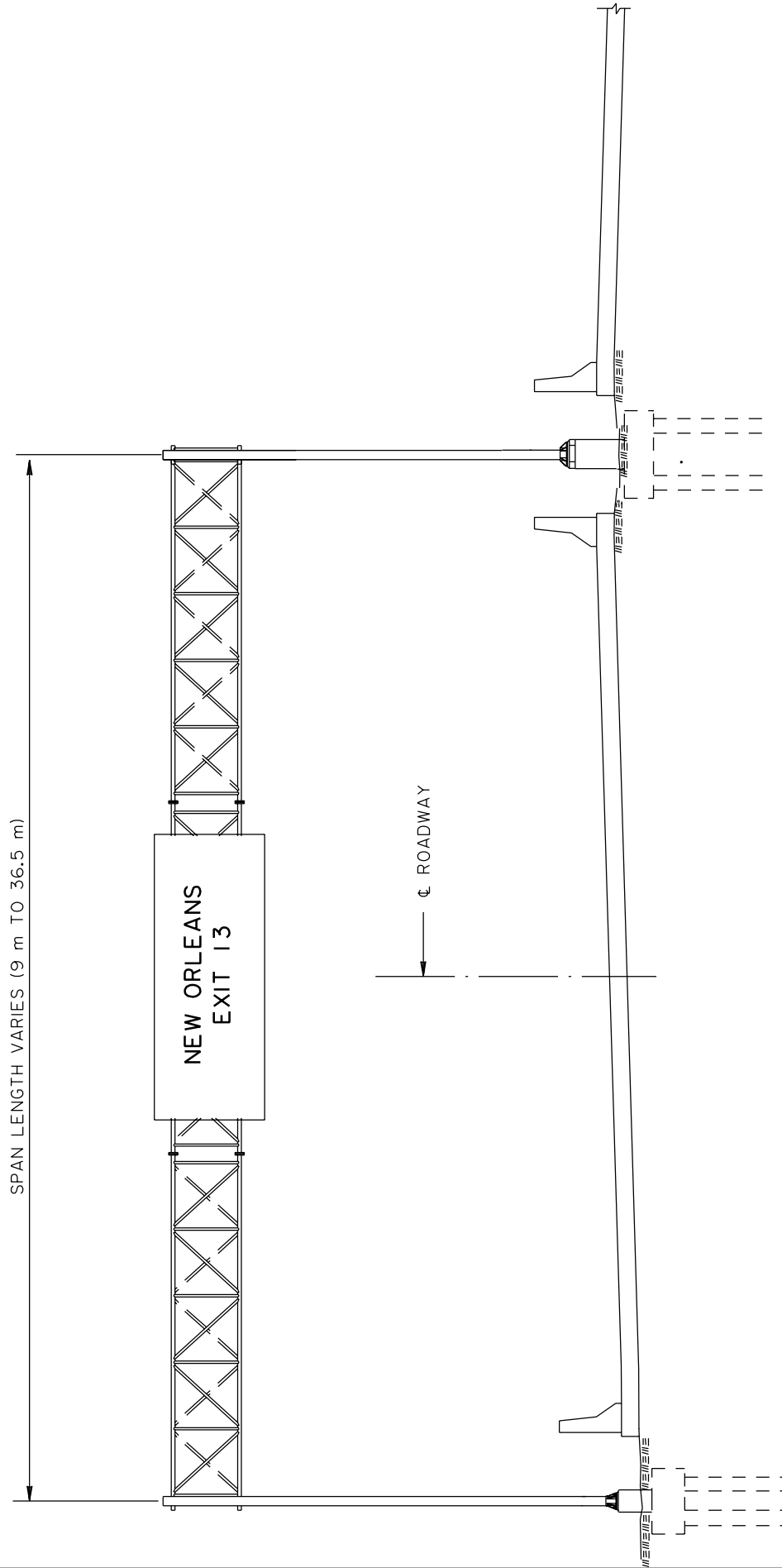
MEDIAN BARRIER
FOOTING

GUARDRAIL

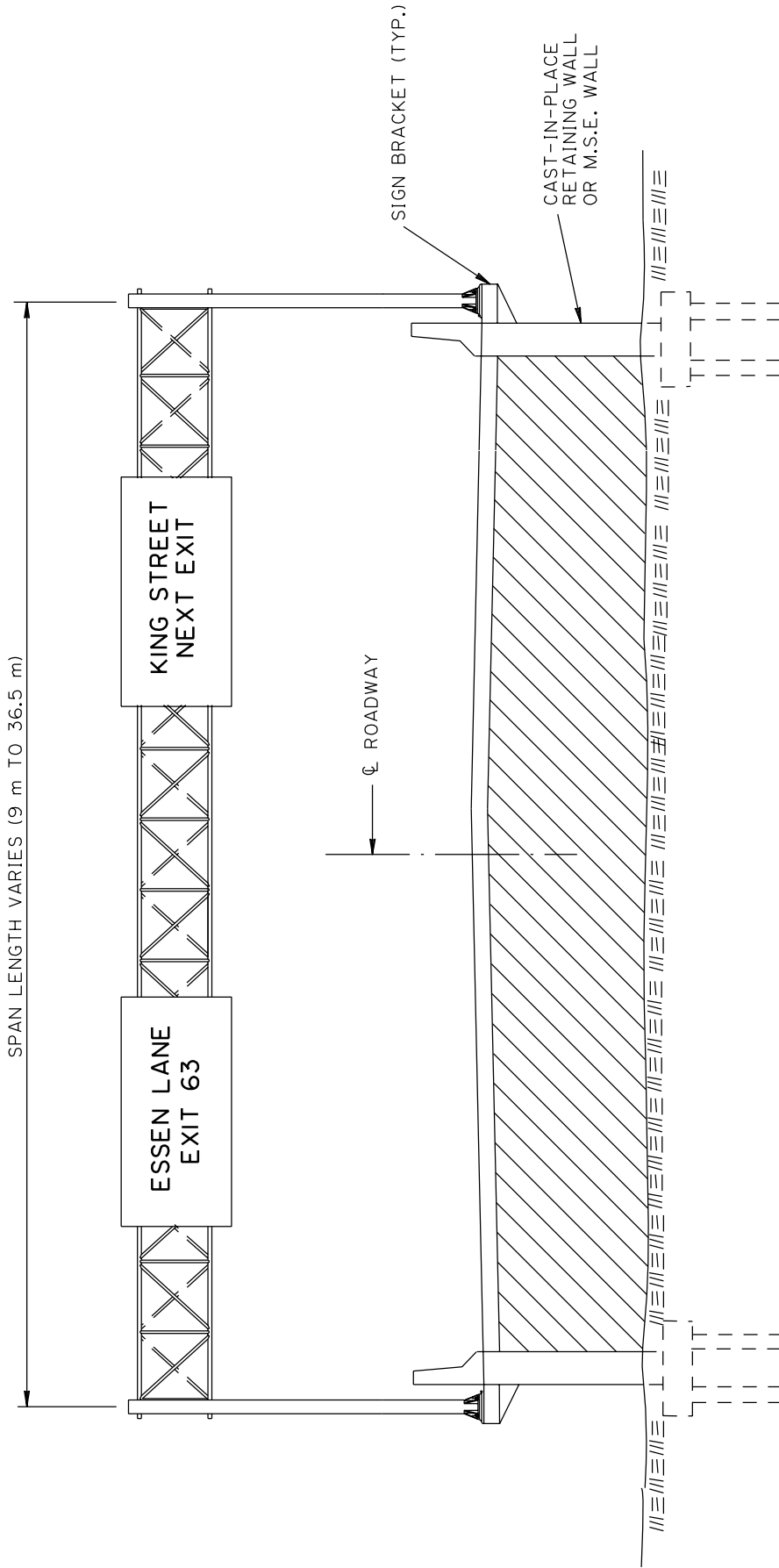
NOTE: FOR FURTHER INFORMATION,
SEE STANDARD SIGNING DETAILS.

TYPE II OVERHEAD SIGN TRUSS
GROUND MOUNTED AND MEDIAN
BARRIER FOOTINGS

3 OF 7



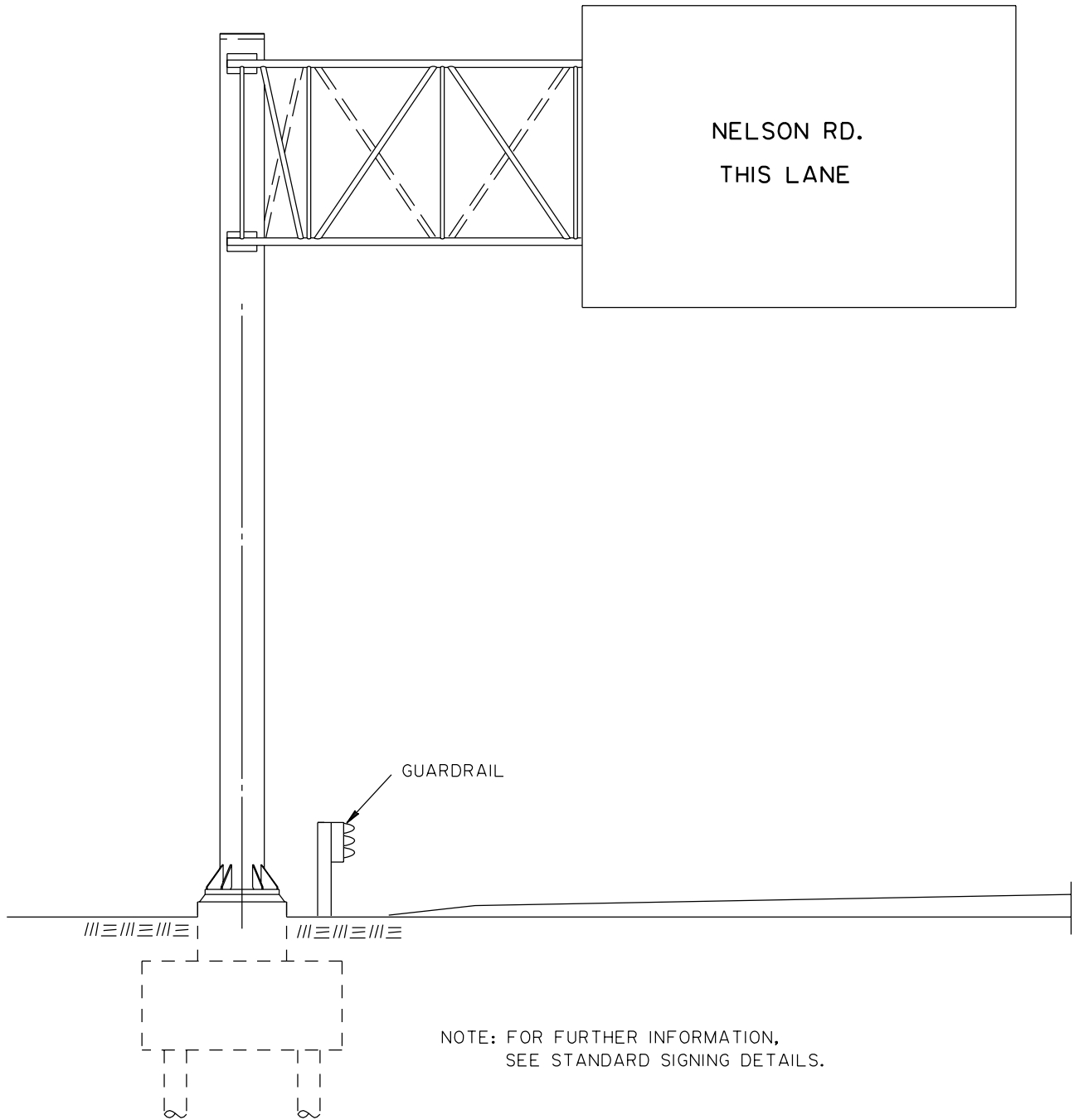
NOTE: FOR FURTHER INFORMATION,
SEE STANDARD SIGNING DETAILS.



NOTE: FOR FURTHER INFORMATION,
SEE STANDARD SIGNING DETAILS.

TYPE II OVERHEAD SIGN TRUSS RETAINING WALL MOUNTED

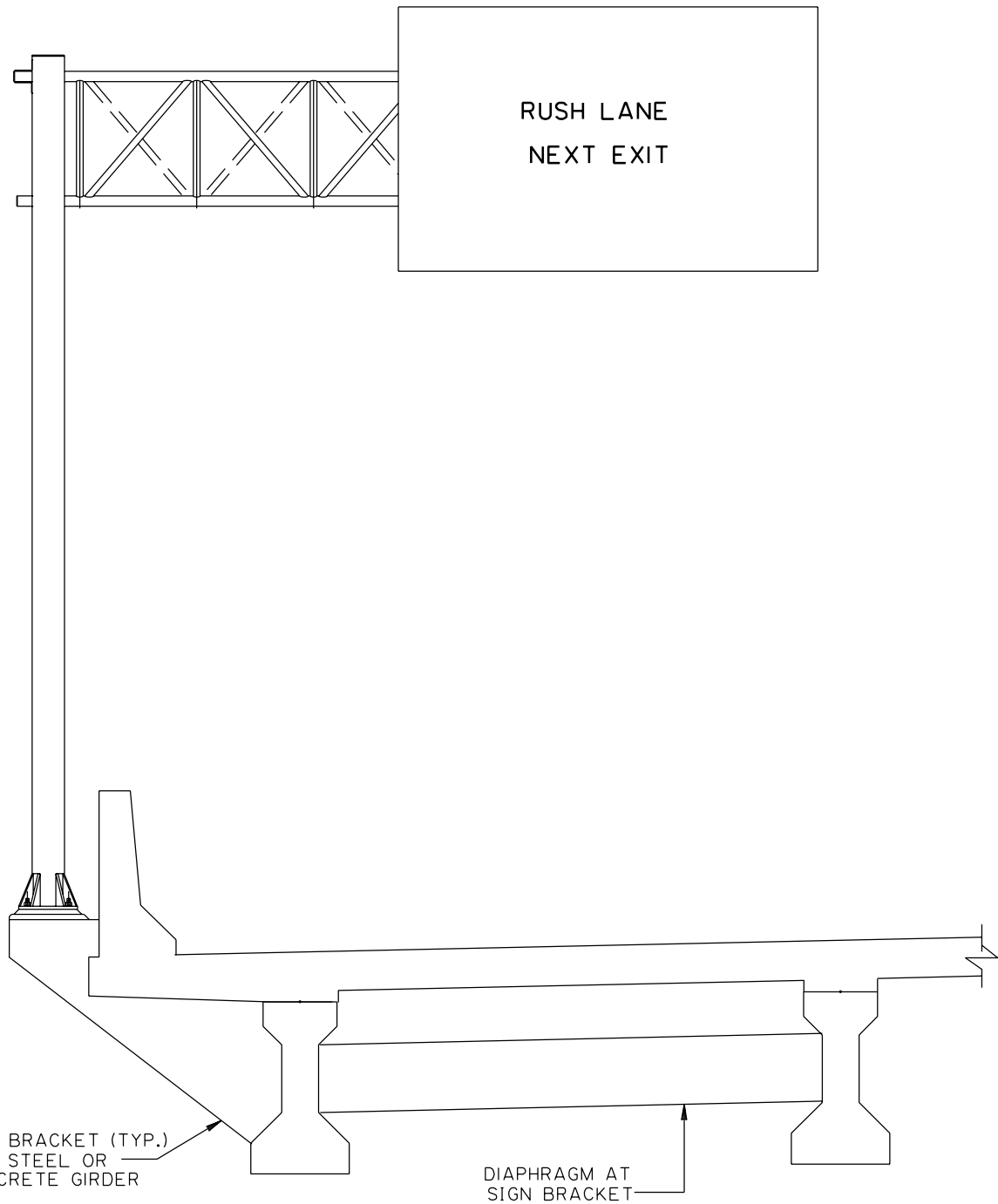
5 OF 7



SINGLE-POST CANTILEVER SIGN
TRUSS GROUND MOUNTED FOOTINGS

6 OF 7

10 (11)



NOTE: TYPE II TRUSS MOUNTING
ARE SIMILAR TO THIS DETAIL

**DOUBLE-POST CANTILEVER SIGN
TRUSS OR TYPE II TRUSS BRIDGE
MOUNTED**

7 OF 7

SIGN TRUSS DESIGN FORM

Please complete the following table as fully as possible

TRUSS DESIGN DATA			
PROJECT NO.		PARISH	
STATION		TRUSS NO.	
GUARDRAIL REQ'D	() YES () NO	REQ'D SPAN (m)	
TRUSS TYPE () EXISTING★ () NEW	() OVERHEAD TYPE II () SINGLE-POST CANTILEVER () DOUBLE-POST CANTILEVER	MOUNTING () EXISTING★ () NEW	() GROUND FOOTING () BRIDGE () RETAINING WALL () GROUND FOOTING - MEDIAN BARRIER
WIND VELOCITY	() 113 km/h () 145 km/h () 129 km/h () 161 km/h	ACTUAL SIGN AREA (m ²)	
DESIGN DATA SUBMITTED BY:			DATE:
COMMENTS:			
★ EXISTING MOUNTING OR TRUSS BUILT UNDER S.P. NO. _____ SHT NO. _____			

The following table is to be completed by the Bridge Design Section

TYPE II TRUSS MEMBER SIZES							
DESIGN SPAN (m)		DESIGN AREA (m ²)			DESIGN WIND (Pa)		
¹ SIGN HEIGHT (m)		ALUMINUM			STEEL		
TRUSS MEMBER	² SEC. NO.	³ O.D.x T (mm)	AVAIL.SIZE	² SEC. NO.	³ O.D.x T (mm)	AVAIL. SIZE	
⁴ POST							
POST STRUT							
POST DIAGONAL							
CHORD							
H. DIAGONAL							
CAMBER (mm)							
ANCHOR BOLT DIA.(mm)							
LOAD CASE							
COMPUTED BY:				CHECKED BY:		DATE:	
COMMENTS:							

¹ Sign height = sign height from the ground to centerline of sign panel

² SEC. NO. IS OBTAINED FROM BRIDGE DESIGN COMPUTER DESIGN TABLES

³ o.d. x t (outside diameter x thickness)

⁴ Design post spacing= 1848 mm + chord diameter + post diameter